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the submerged algal flora of tropical freshwaters the Cyanophyceae also constitute a very important element, though not as preponderant as in the subaerial flora. This freshwater flora is composed of forms in which narrow filaments are much more abundant than broad ones, a fact thought to be related to the small amount of dissolved oxygen in the water. *Cladophora* and *Rhizoclonium* are very poorly represented, and *Vaucheria* and *Botrydium* are very rare. The Confervales are not very well represented, and probably the Ulotrichales do not attain much development. *Spirogyra*, on the other hand, is even more abundant in the tropics than in northern latitudes. The desmids show a marked filamentous tendency, which may be due to poor aeration. *Oedogonium* is very abundant, and the freshwater red algae are not at all uncommon.—J. M. C.

Gametophytes and embryo of *Libocedrus*.—LAWSON²¹ has added *Libocedrus* to the investigated Cupressineae and shows that it agrees in all essential characters with the other genera of the group, as may be seen from the following outline of the results. No prothallial cells are formed in the pollen grain, which at shedding contains the generative and tube nuclei. The pollen tube advances very directly to the archegonial chamber, and upon its arrival the body cell divides to form two large and equal male cells. One to three megaspore mother cells occur and each gives rise to a tetrad. The functioning megaspore becomes filled with endosperm tissue in the usual way, and the megaspore membrane is poorly developed. The archegonia range in number from six to twenty-four, and are grouped in a single complex, invested by a single layer of jacket cells. The ventral canal cell, as in other Cupressineae, is represented only by its nucleus. The contents of the pollen tubes are discharged into the common archegonial chamber, so that both male cells in a tube may function. In fertilization the male slips from its cytoplasmic sheath and unites with the egg nucleus. The two nuclei arising from the division of the fusion nucleus pass to the bottom of the egg and by two successive divisions form eight free nuclei before wall-formation. The cells of the proembryo are arranged in the usual three tiers.—J. M. C.

Evolution of the vascular system of ferns.—TANSLEY²² has begun the publication of a series of lectures on the evolution of the vascular system of the Filicineae, the first considering the origin of the pteridophytes. The lecturer commits himself to the following positions: that bryophytes and pteridophytes have arisen from the algae independently; that the alternation of generations of the former is "antithetic," of the latter "homologous;" that the prevailing habit of dichotomy among the Filicineae indicates ancestors of the dichotomously branching thallus type, in which the "sporangiferous thallus became specialized for assimilatory functions;" that from such forms the "Filicales, Sphenophyllales, and Equis-

²¹ LAWSON, ANSTRUTHER A., The gametophytes and embryo of the Cupressineae with special reference to *Libocedrus decurrens*. *Annals of Botany* 21:281-301. pls. 24-26. 1907.

²² TANSLEY, A. G., Lectures on the evolution of the filicinean vascular system. I. *New Phytol.* 6:25-35. 1907.